

Claims

1. A banding system for piled products, such as securities, banknotes, checks and other similar documents, with a machine frame (8), a band feed mechanism (6) disposed on said machine frame (8) for feeding band material (2) from a supply roll (1), means for forming a loop (7) with said band material (2) around the products to be banded, welding means (14, 15) to close said loop and cutting means (17) for cutting said band material, said means for forming the loop comprising transporting means (111, 13) for transporting the band material (2) around the product to be banded and vacuum means (19, 19', 24) connected to the transporting means for pressing the band material (2) against the transporting means (111, 13), wherein said means for forming the loop (7) are movable with respect to the machine frame (8) between an operating position where said means for forming the loop (7) are in contact with said band feed mechanism (6) to perform the banding operation and an open position where said means for forming the loop (7) are displaced away from the band feed mechanism (6) to create an opening therebetween allowing a transfer of products to be banded between the band feed mechanism (6) and the means for forming the loop (7).

2. A banding system as claimed in claim 1, wherein said means for forming the loop (7) are movable in translation with respect to the band feed mechanism (6).

3. A banding system as claimed in claim 2, wherein said means for forming the loop (7) are displaceable on said machine frame (8) through sliding rail means (9) disposed on said machine frame (8).

4. A banding system as claimed in one of claims 1 to 3, wherein said means for forming the loop (7) are displaced by means of a piston.

5. A banding system as claimed in one of claims 1 to 4, wherein said transporting means comprise a plurality of transporting rolls (111) connected by conveyor means (13).

6. A banding system as claimed in claim 5, wherein said conveyor means (13) are rubber rings.

7. A banding system as claimed in one of claims 1 to 6, wherein said transporting means (111, 13) and said band feed mechanism (6) are driven synchronously by means of a transfer belt mechanism (22, 22', 222, 223, 224).

8. A banding system as claimed in claims 1 to 7, further comprising a pressure means (10) for applying pressure on said products during the banding operation.

9. A banding system as claimed in claim 8, wherein said pressure means (10) is formed of a pressure stamp which is guided on the means for forming the loop (7) and is displaceable with respect to the means for forming the loop (7).

10. A banding system as claimed in one of claims 1 to 9, wherein said vacuum means include a vacuum channel (24) and means (19, 19') for generating vacuum into said vacuum channel (24) in order to press said band material (2) against said transporting means (111, 13) during transport of the band material (2) around said products.

11. A banding system as claimed in claim 10, wherein said vacuum channel (24) includes a first channel portion (24a) located in said machine frame (8) and a second channel portion (24b) located inside said means for forming the loop (7) and which connects to the first channel portion (24a) during the banding operation.

12. A banding system as claimed in claim 11, wherein said means for generating vacuum into said vacuum channel (24) include a main vacuum pump (19) coupled to the first channel portion (24a).

13. A banding system as claimed in claim 12, wherein said means for generating vacuum into said vacuum channel (24) further include an auxiliary vacuum pump (19') coupled to the second channel portion.

14. A banding system as claimed in one of claims 11 to 13, wherein said means for forming the loop (7) are constructed as a part substantially having an inverted U-shape and wherein the second channel portion (24b) located in said means for forming the loop (7) is open on an inside area of the U-shaped part, where the band material is transported, and at one extremity of the U-shaped part which connects, during the banding operation, with a corresponding open extremity of the first channel portion (24a) located in said machine frame (8).

15. A banding system as claimed in one of claims 1 to 14, further comprising a pusher for moving laterally the banded products after the banding operation and freeing the banded

products from the welding means (14, 15) once the loop is closed.

16. A banding system according to one of claims 1 to 15, having a substantially planar configuration which is substantially aligned with the plane in which said band material (2) is transported.

17. A banding process for piled products, such as securities, banknotes, checks and other similar documents comprising the following steps:

- a) displacing products to be banded onto a banding system comprising a band feed mechanism and means for forming a loop with band material around said products to be banded;
- b) transporting band material around said products to be banded;
- c) generating vacuum around said band material while it is transported around the products to be banded;
- d) attaching the band material to form a closed loop; and
- e) evacuating the banded products,

wherein said step of displacing the products onto the banding system includes:

- a1) displacing the means for forming the loop away from the band feed mechanism to create an opening therebetween;
- a2) transferring the products to be banded through the opening between the band feed mechanism and the means for forming the loop; and
- a3) displacing the means for forming the loop to get into operating contact with the band feed mechanism and allow the banding operation to take place.

18. A banding process as claimed in claim 17, wherein the step of attaching the band material is made by welding or by glueing.

19. A banding process as claimed in claim 17 or 18, wherein it comprises a cutting step of the band product once the closed loop is formed.

20. A banding process as claimed in one of claims 17 to 19, wherein the displacement of the means for forming a loop with band material with respect to the band feed mechanism is made by translation.

21. A banding process as claimed in one of claims 17 to 20, wherein the means for forming a loop with band material are displaced with respect to the band feed mechanism before and/or after the banding operation.

22. A banding process as claimed in one of claims 17 to 21, wherein, after formation of the closed loop, the banded products are moved laterally so as to free the banded products from welding means (14, 15) used for attaching the band material.

23. A banding process as claimed in one of claims 17 to 22, further comprising the step of applying pressure onto said products during the banding operation.

24. A banding machine comprising a plurality of banding systems as defined in one of claims 1 to 16, said banding systems being placed one next to the other.